

A Method for Assessing Airspace Efficiency in Super Density Operations Using an Airspace Phase State Approach, Phase I

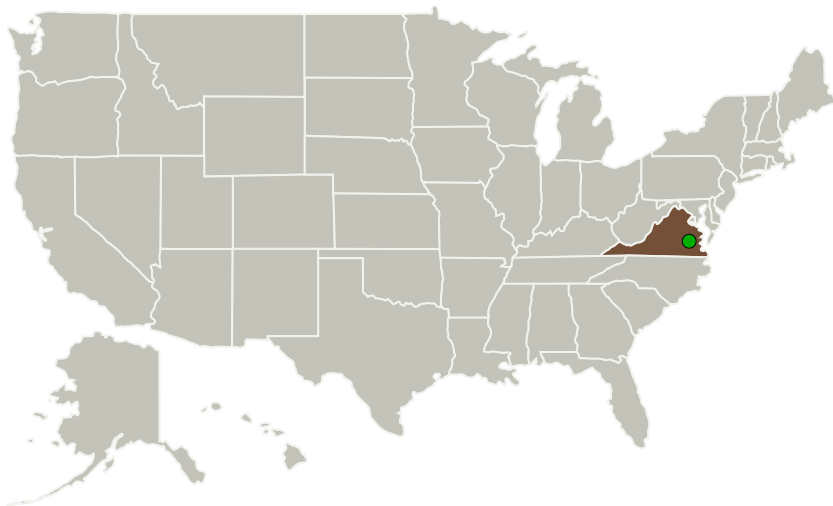
Completed Technology Project (2012 - 2012)



Project Introduction

One of the challenges to assessing NextGen operational improvements in the National Airspace System (NAS) lies in the ability to understand and measure the efficiencies associated with new concepts and technologies, including the effects of integrating traffic controls for the most optimal results. Existing approaches for studying air traffic management concepts have explored methods for understanding airspace complexity based on flight path geometries, airspace architectures, and pilot/controller workloads. These approaches have been largely based on phenomenological and heuristic studies that provide important, but limited, understanding of causal factors and minimum predictive power over long look-ahead times. The recent development of dynamic trajectory algorithms by NextGen AeroSciences, LLC (NextAero) provides the ability to compute the phase states of the airspace in future time, based on principles from traffic physics, phase transitions, and the science of Complex Adaptive Systems. In a Phase I project, NextAero proposes to establish the feasibility of phase state analysis as a tool for assessing the benefits of NextGen concepts in the densest airspace. If shown to be feasible, this computational tool will provide a viable means of computing, predicting, and managing airspace phase states from satisfiable (uncongested) to unsatisfiable (congested) conditions, as affected by various NextGen concepts.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
NextGen AeroSciences, LLC	Lead Organization	Industry	Williamsburg, Virginia
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations

Virginia

Project Transitions

**March 2012:** Project Start**August 2012:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137828>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

NextGen AeroSciences, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Bruce J Holmes

Technology Maturity (TRL)

Start: 3

Current: 4

Estimated End: 4



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Technology Areas

Primary:

- TX16 Air Traffic Management and Range Tracking Systems
 - └ TX16.4 Architectures and Infrastructure

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System